

Burts Miller Ranch

The Burts Miller Ranch snow course is located on the main-stem of the Bear River, about ¼ mile off of highway 150 on the east side and just south of the Burts Miller Ranch headquarters and barns/corrals. The site is at an elevation of 7900 feet msl. Potential weather modification: 77, 89-93, 95, 01-

Burts Miller Ranch snow course is exactly as it was 70 plus years ago with the exception of the addition of two irrigation/recreation ponds located a short distance above the course, as well as an irrigation ditch immediately adjacent to the course that were installed in the mid 1970's. Also, along Mill Creek, to the east of the snow course, there have been several beaver dams built in recent times. Immediately above the course there is an ephemeral stream and a cattle crossing that has made a path directly along the course. Many of the snow notes from this course document standing water at the soil/snow interface. The property owner has stated that he used to be able to ride a horse across the meadow during late fall and early spring after melt-out, but is no longer able to because the meadow is too wet and tends to pull the shoes off the horse as it bogs down. He states that the irrigation ponds, stream, and beaver ponds are sub-irrigating the meadow, where the snow course is located, throughout the late fall, winter, and spring months. This course is statistically getting less snow from 1990-2005 than in previous years by about 20%, or about three centimeters. This decline could easily be due to the transference of heat energy via sub-irrigation to the snowpack.

The following 1936 photos show the open meadow that the snow course is located in. It runs down the meadow from right to left, just past the car in the first photo. Notice how flat the meadow is and the height and location of the aspens. The vegetation has not had significant changes between the time of this photo and the current condition in 2007.



Looking north along the main axis of the course.



Looking east perpendicular to the course.



In this recent photo the ditch along the snow course as well as the mottled/dimpled snow surface indicative of uneven melting patterns are visible. The ditch is actually a cattle trail down the meadow and along several of the sample points. It seems as though the cattle use the marker poles as a scratching post at times, as the area around the poles can be trampled as well.



This photo taken at the south end of the snow course shows the cattle crossing at a small ephemeral stream at the head of the meadow.



The stream a little higher up from the south end of the course and shows clear evidence of overland flow with erosional features.



The course looking from north to south. The trees have slightly encroached into the meadow but not in a way that we think would substantially impact the accumulation or ablation characteristics.



This photos shows the slight change in topography caused by the cattle. The sample marker is directly in the cattle trail/ditch. The impact to snow accumulation is, however, much more dramatic as noted in previous photographs.



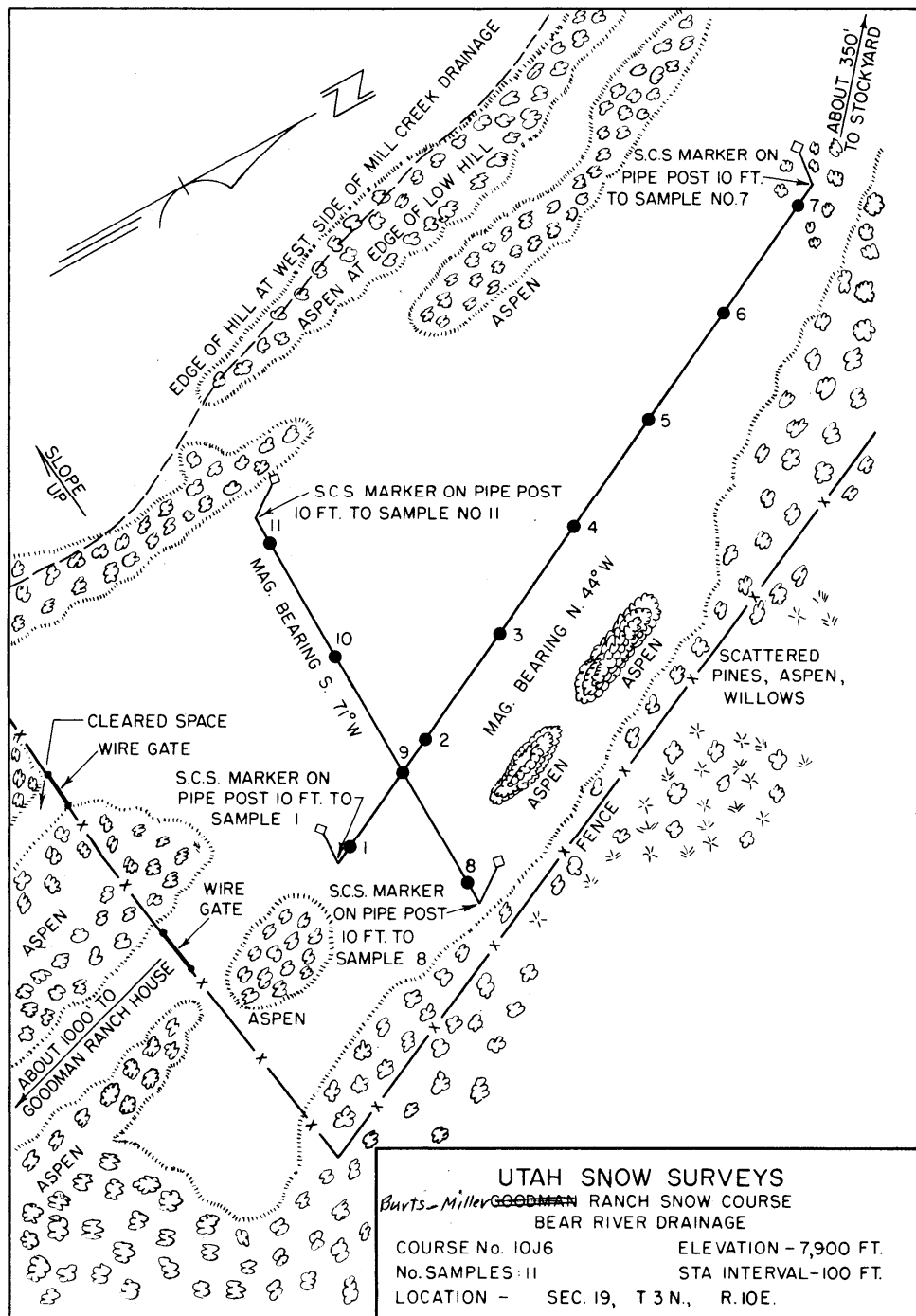
From that small change in topography and likely from the impacts of sub-irrigation, note the dramatic change in snow accumulation along that path in this photo from the March 2007 survey. Also notice the same mottled look with dimples in what should be a pretty homogenous snowpack across a flat meadow.



This photo taken on the same March 2007 survey, clearly displays the impacts of what appears to be water features in the meadow as well as the cattle trail. The impacts on accumulation are evident in the features however, what is not precisely known is what the impact may be on the entire meadow. If the area has changed in subsurface water characteristics from the ponds, irrigation ditches, springs, beaver dams, etc that may impact the surface energy balance, then the snow accumulation/ablation characteristics may well have changed at this site as well.



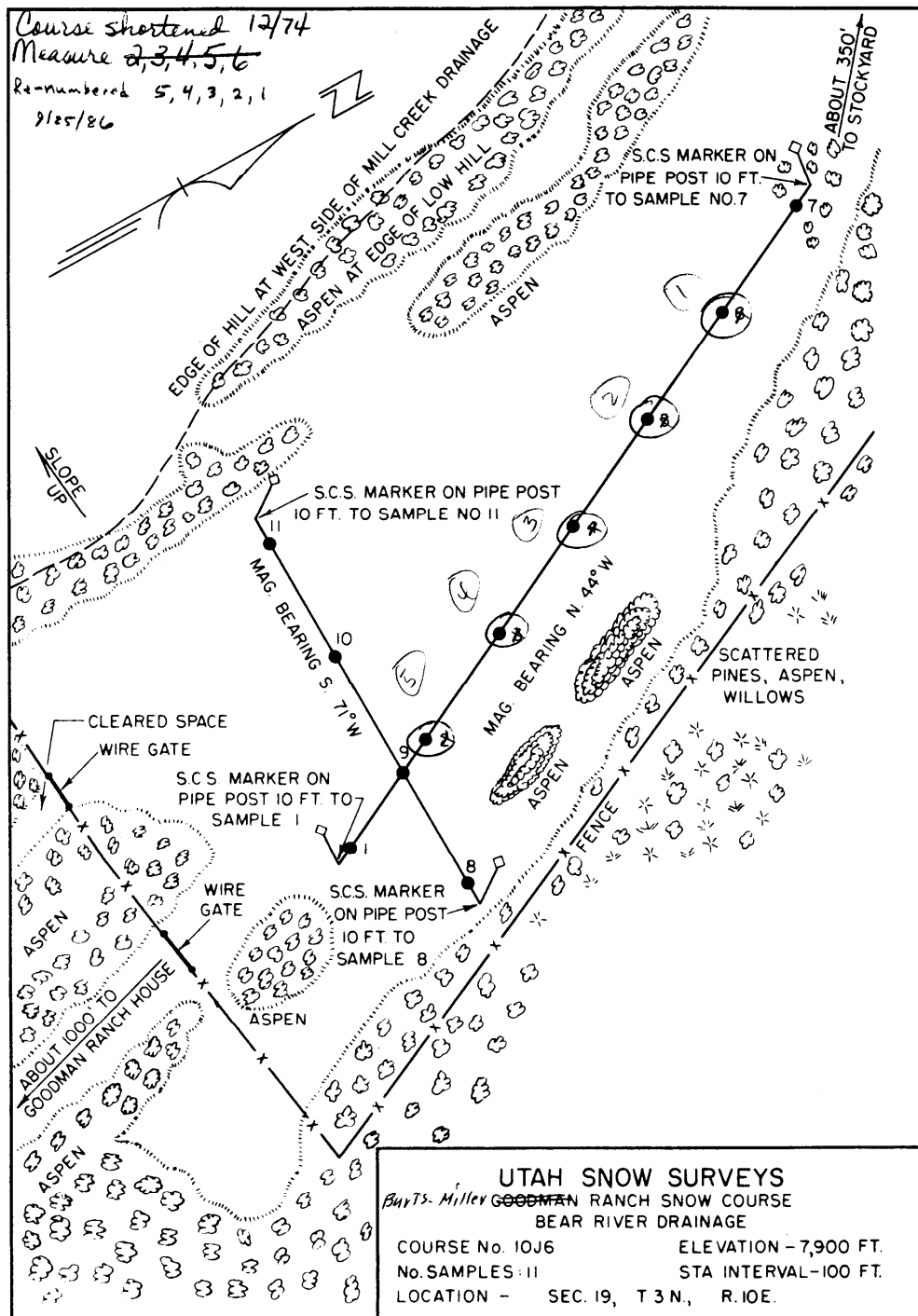
The irrigation ponds are in the center right of the photo and the ranch buildings are in the center. Mill creek is to the left side and the snow course is several hundred yards to the north, or the bottom, of this picture.



U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

7-L-16156-12

Course shortened to 11 points from 20, cross pattern kept.

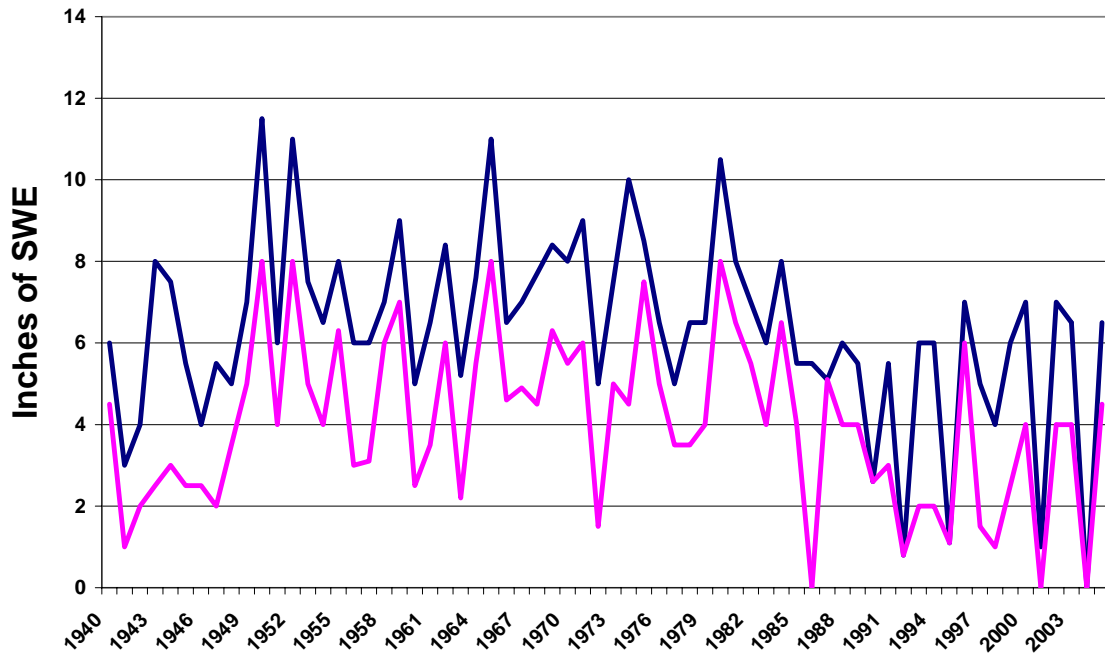


U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE

7 - L - 16156 - 12

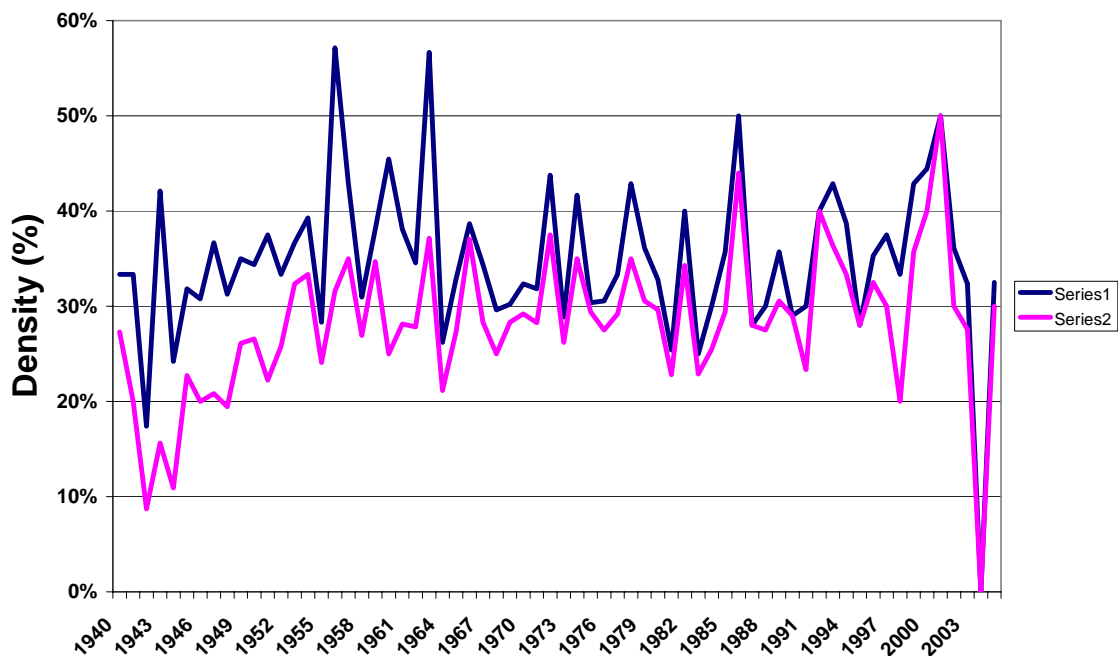
Course shortened to 5 points in 1974, renumbered to current condition in 1986.

Burts Miller Ranch Sample Point SWE - Max/Min

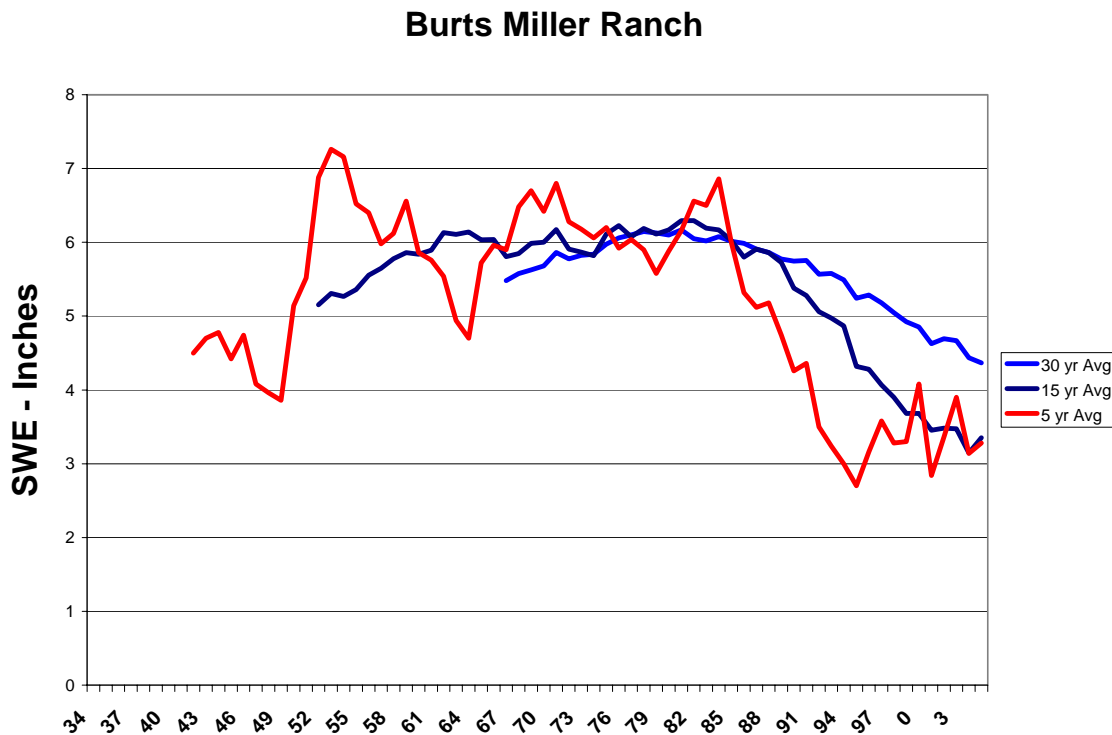


This chart shows the max and min of the individual sample point SWE values. Note that the values fell in the early 80s and then remain relatively constant there after.

Burts Miller Ranch Sample Point Density - Max and Min



This chart shows the max and min sample point densities over time. In the early part of the record, densities were very diverse due to the fact that only one sample was taken at each point. In the late 50's and early 60's sampling was done to more rigorous technical standards and the spread of sample densities was limited to no more than 5% across all sample points, ensuring a much better overall snow course measurement. That said, it does not appear that densities have seen a much change. The one anomaly, seen in 2005 is a zero value of snow on the course, thus zero density.



This chart shows the 5, 15 and 30 year running average SWE for April 1 values since the beginning of the course. One can clearly see a decline in SWE accumulation in the early 80s. The ditches and ponds were installed in the mid 70's.

Use of this snow course for long term data comparison is not recommended due to the complex nature of physical processes that may be occurring at this site. It is likely that sub irrigation from various sources is impacting both accumulation and ablation characteristics. The quantification of these impacts from others that may also be going on is indeterminate at this time and as a consequence we cannot isolate and remove that impact.

R Julander
2007